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This volume is dedicated to Dr. Rainer Zangerl

INTRODUCTION AND INDEX TO FIELDIANA: GEOLOGY VOLUME 33

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Probably every author represented in this volume has a different appreciation of Rainer Zangerl. That this is so reflects not only the variation within the population of contributors, but also Rainer's own multifaceted nature. Many of us know him best as a field man; many know him for his expertise in the systematics of turtles and other squamose animals, or of wildly various chondrichthyans, or in dental histology, or evolutionary theory. Many of us know him as a man of strong opinions: his early perception of environmental concerns was not widely shared at a time when most people casually considered natural resources to be limitless and their squandering to be harmless. Some of us know him as teacher and mentor. A few of us know him in all of these capacities.

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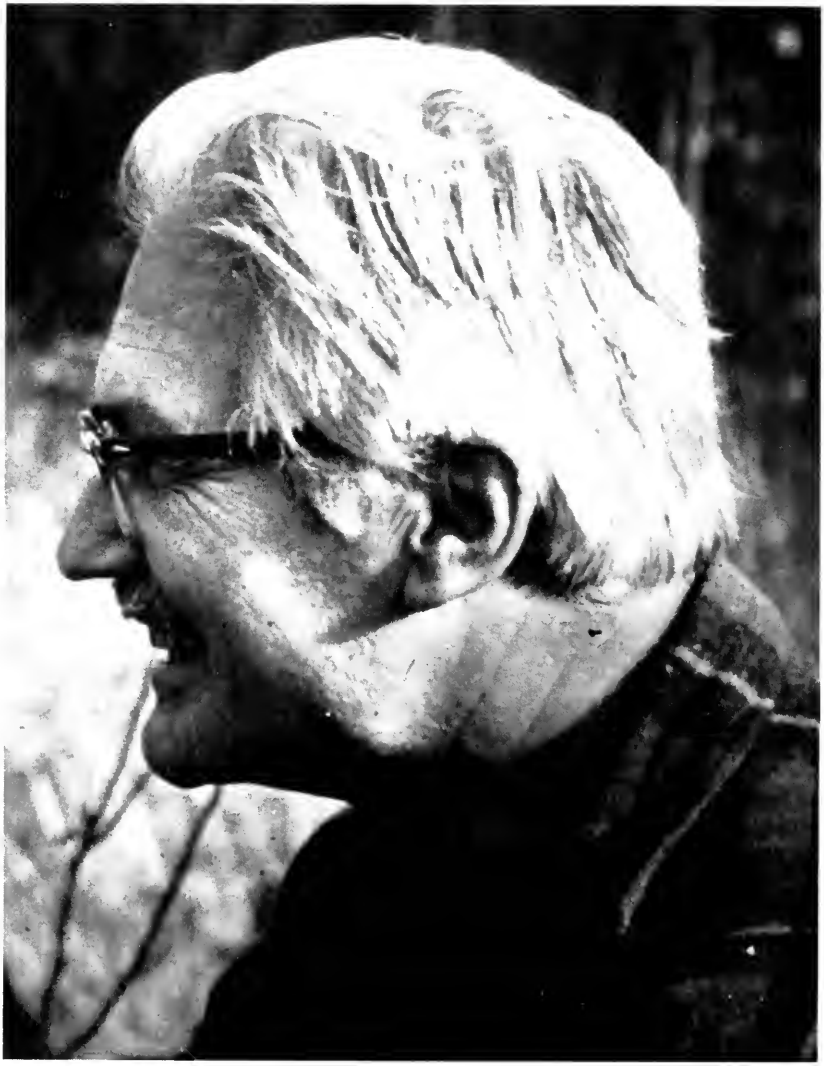

RAINER ZANGERL

One cannot think of Rainer without thinking also of Anne, his wife. Many of us cherish the memory of evenings in their house in suburban Chicago, which Rainer designed, or in the much more elaborate home in Hajji Hollow, Indiana, which he also designed and which he and Anne built over a period of years. This Festschrift, though naming one in its dedication, is really dedicated to both. At home or in the field, they are a unit.

Rainer was born in Switzerland in the ancient town of Winterthur near Zurich and spent his boyhood summers in the Alps of Switzerland and in the Austrian Tyrol. If his house in Hajji Hollow has an Austrian look, it is because it owes something to the family's ancient summer retreat in the Paznaun Valley. If the front door seems to have come from a Viennese townhouse, it is because Rainer made it, paneled within panels of two-inch thick laminated oak, from plans in an old book on German carpentry. If the furnace is not recognizably standard American, it is because Rainer made it, with a great heat sink of five tons of brick and rock, on the model of the 16th-century central heating system in the Paznaun house.

As a boy in the summer of 1928, Rainer was sent to the upper Rhône Valley in French Switzerland to stay with the local priest and learn French. Things were not very lively, and so when one of the local boys was taken sick, Rainer volunteered to herd the cows to and from their nearly vertical meadows and to do the milking. Swiss cows, on account of their remarkable diet of wildflowers, yield a substance that approximates whipped cream. Extracting this delicious fluid from the cows, however, is a job for the horny-handed, and so Rainer duly developed calouses. At the end of the summer, he returned to Winterthur with hardened thumbs, a good coat of tan, and a practical knowledge of French, not to mention an understanding of how the inhabitants of the Rhône Valley made their renowned cheeses and wines. In contrast to this pastoral summer, he spent the winter of 1928-1929 perfecting his English at Highgate College, a typically spartan boarding school in London.

Rainer then entered the University of Zurich and there began the studies that would shape his professional future. Among his professors was Hans Schinz, a roentgenologist, whose course emphasized avian osteogenesis. Rainer absorbed the subject matter, but also took advantage of the professor's technicians to learn how to use the x-ray machines. He had fossils in mind, being determined to become a vertebrate paleontologist. His major professor was Bernhard Peyer, from whom he took vertebrate anatomy and paleontology. He served as Peyer's assistant in quarrying Triassic fossils

from a bituminous limestone in the Tessin in southern Switzerland, and it was there that he obtained the specimens of *Pachypleurosaurus* on which he wrote his dissertation. Rainer received the Ph.D. degree from Zurich at the age of 23, the youngest up to that time on the University records.

Because there were no jobs in Switzerland for paleoherpetologists in 1935, Rainer sent bundles of résumés to far places. A belated response from a Zurich graduate in South Africa offered not a job, but advice: go to the United States. So off he set on a slow boat for New York. There he encountered Al Romer, who arranged an appointment for him at Harvard as guest researcher in comparative anatomy. Al also allowed Rainer to use his house in Cambridge for a term while he was away. With a job and a place to live, things were looking up, and so Rainer sent for his fiancée, Anne Kurz, in Winterthur, and they were married in Cambridge in 1937.

The guest position at Harvard ended with the spring of 1938, and it was necessary to find something more permanent. After seeing an announcement of Middlesex University, which was then expanding to include veterinary science, Rainer went to Waltham, Massachusetts, to discuss the matter with the proprietor, Dr. John Hall Smith, and the president, Dr. Ruggles Smith. At the close of an agreeable conversation, the faculty in veterinary science had been expanded from 0 to 1, and Rainer became not only professor, but head of the department, with a salary of $125 per month. One of his first official acts was to appoint Anne as half-time instructor at a monthly salary of $25. He and Anne then moved to Waltham.

At Middlesex University, Rainer found an outlet for another of his talents. In conversation with Dr. Smith, the proprietor, Rainer happened to mention that he had some knowledge of drafting, derived from his architect father. As a result, he received a $30 architectural commission for designing a proper laboratory building for veterinary anatomy. The building was actually built after the Zangerls had left Middlesex. The basic edifice apparently still stands as a part of Brandeis University but extensively enlarged.

In 1939 Rainer and Anne moved to Detroit, where Rainer had accepted the position of instructor in zoology and comparative morphology at the University of Detroit. Although the University of Detroit was far better equipped than Middlesex, the budget was still tight, and in order to provide specimens for the anatomy classes, Rainer proposed going to Florida to collect dogfish and whatever else might turn up. He and Anne had a happy collecting season, the first of their many trips that have made them familiar

with large parts of this country. Their first paleontological collecting in the United States was also for Detroit. They collected in the Big Badlands, gathered Green River fishes in Wyoming, and crossed the mountains to the Uinta Basin for its Eocene vertebrate fossils.

Rainer left Detroit in 1942 for a position as assistant professor of comparative anatomy at Notre Dame, where he stayed for three terms. Then, on the recommendation of Karl P. Schmidt, Chief Curator of Zoology at Field Museum, he came to Chicago as Curator of Fossil Reptiles and Amphibians in the Department of Geology. Here, he found Paul McGrew and Bryan Patterson as stimulating colleagues. Dwight Davis, Clifford Pope, Robert Inger, Loren Woods, Rupert Wenzel, and Henry Dybas, all in the Department of Zoology, and Theodor Just in the Department of Botany also provided scientific interchange.

Rainer's career at the Museum included much field work. He made several trips to the Cretaceous chalk near Selma, Alabama, and from these trips came the fossil turtles on which he based five important Field Museum memoirs, as well as incidental fishes, dinosaurs, and mosasaurs for the collection, later monographed by others. Rainer became a world authority on fossil turtles, and at that period it seemed that they would occupy him for the rest of his career.

Probably to his own surprise, turtles were eventually eclipsed in Rainer's research by fishes. In conversation with Loren Woods, the Museum's ichthyologist, Rainer emphasized the importance of fossils in determining fish phylogeny. But how, wondered Loren, does one obtain fossil fishes? Well, Rainer went on, after one has been collecting fossils for many years, one develops a sense for what rocks may be fossiliferous. Loren was willing to be convinced and suggested a trip to Posey County, Indiana, where some Woods relatives had a coal mine with nice fresh rock exposed in the headwall. Rainer did, indeed, locate a thin bed of black shale that looked promising, and when they dug into it, there were, indeed, fragments of fossil fishes.

On the way back to Chicago, as they were zooming along U.S. 41, on a hill near Mecca in Parke County, Indiana, Rainer noticed a likely looking rock along the roadside. They stopped to examine the rock, and found it was more than promising. Each piece of the Pennsylvanian black shale that they split revealed a fossil fish—articulated fossils of whole palaeoniscoid fishes or intact, though dismembered, parts of sharks. Rainer showed the new locality to Bob Denison, Bill Turnbull, and Gene Richardson from the Museum and

to Bernhard Peyer, who happened soon afterward to be visiting this country. They all found specimens in good number.

When other projects permitted, Rainer and Bill Turnbull went back to Parke County and located a likely spot for a quarry. By good fortune, the landowner happened to own a small bulldozer and was more than happy to dig a small quarry on the black shale. With the help of Gene and a succession of students, Rainer and Bill pried up the joint blocks from their Mecca Quarry and took them back to the Museum, where they were reassembled in a large laboratory. For two years the teams split and x-rayed the slabs of shale, charting every fossil fragment, with a running exchange of theory and countertheory regarding how such a dense concentration of fossil fishes could have come about. Field interludes were devoted to mapping the lateral extent of the occurrence, with its variations in fauna and lithology. In 1957 one of the new localities developed into Logan Quarry, much larger than Mecca Quarry, and the next year another became Garrard Quarry.

After numerous debates and a month in Louisiana studying fish decomposition in nature, Rainer and Gene presented their evidence in 1963 in a Field Museum memoir. Rainer followed this in 1973 with another memoir (with Gerard Case) describing the Iniopterygia, a new order of cartilaginous fishes from the Pennsylvanian black shales, and he has since completed a manuscript on their amazingly varied and important sharks.

In the midst of his work on black shale fish, Rainer undertook two very different projects. Dwight Davis, the Museum's distinguished comparative anatomist, asked him for help in deciphering the impenetrable German of a book on phylogenetic systematics by one Willi Hennig. They became interested in the principles that Hennig set forth. Presently they were spending their lunch hours together, and in a year or so produced a fluent translation which was published in 1966 by the University of Illinois Press. This book has been the introduction to cladistics for most English-speaking biologists. Rainer also translated from the German a text on dental histology by his old Zurich professor, Peyer, which was published in 1968 (unfortunately, after Peyer's death).

The Pennsylvanian black shales have been the most sustained of Rainer's many field projects for the Museum, following other programs in the Cretaceous of Alabama and Texas and in the Eocene and Triassic of Wyoming. But the lovely hardwood forests and the shale outcrops and wild gullies of the Mecca area in Parke County took a firm hold on Rainer's affection, and he bought a secluded

tract, a natural amphitheater with outcrops of fossiliferous black shale, where he has built his retirement home-and-laboratory, appropriately known as Hajji Hollow (a Hajji is, of course, one who has been to Mecca). "Retirement" is, however, a misnomer for Rainer's current activities. The work on Pennsylvanian black shale fossils is in fact ongoing to this day with undiminished vigor, as are such sidelines as wine-making and house design and construction. We join Rainer's many friends and associates in the hope and expectation that this happy state of multiple affairs will long continue.

AUTHOR INDEX

SUBJECT INDEX

In this index, only the first page reference within a given paper is cited for any topic; readers should look on later pages for additional references. Names of stratigraphic units are bunched under the pertinent system entries. Subgenera are indexed as genera. Trivial names are not indexed except for *zangerli* and other new species, and citations of authors are not indexed except for Rainer Zangerl; this practice emphasizes the dedicatory nature of the volume.

This index was compiled with the help of Olive Turnbull.

ERRATA

p. 64, *Vespertiliavus* should be on the same line as *bourguignati.*
p. 126, line 7 from bottom, for "is," read "are."
p. 371, for *Leptacodon,* read *Leptecodon.*
p. 535, for *Janessa,* read *Janassa.*
p. 543, for "confolute," read "convolute."
p. 577, for "robbin's," read "robin's."
p. 595, line 7, for "Sec. 7," read "Sec. 27."